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ABSTRACT

This study uses linguistic humor to show that awareness of only those linguistic units transcribed by the orthography bear a special relation to early reading success. The study is decribed following a review of the literature and a discussion of advantages and problems associated with the use of humor appreciation as a probe of children's linguistic abilities. Subjects were 48 second-grade children from a predominantly white, middle class public school in Costa Mesa, California, divided almost evenly between boys (n=25) and girls (n=23). Their mean age was 8;3, with the boys being slightly older than girls. Classroom reading levels varied from highest (n=21) to middle (n=17) to lower (n=9). The children were tested on 10 phoneme/morpheme riddles which manipulate phonemes and bound morphemes, and 10 control riddles which depend on awareness of other aspects of linguistic structure and common sense. Three types of ability were measured: reading, IQ, and humor resolution. Reading ability was significantly related to correct resolution of the phoneme/morpheme riddles but not to correct resolution of the control riddles. Results indicate that while IQ is related to the resolution of riddles in general, reading ability has a special relation to riddles which manipulate phonemes and morphemes, consistent with the morphophonological nature of English orthography. Appended are 48 references and related materials. (Author/GLR)

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Using Children's Humor to Clarify the Relationship Between Linguistic Awareness and Early Reading Ability

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Running Head: HUMOR AND READING ABILITY

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Abstract

This study uses linguistic humor to show that an awareness of only those linguistic units transcribed by the orthography bears a special relation to early reading success. The subjects were 48 second-grade children tested on ten 'phoneme/morpheme' riddles which manipulate phonemes and bound morphemes and ten 'control' riddles which depend on awareness of other aspects of linguistic structure and 'common sense.' Each child also received the Word Identification and Word Attack subtests of the Woodcock Reading Mastery Tests and the Peabody Picture Vocabulary Test. Reading ability was significantly related to correct resolution of the phoneme/morpheme riddles but not to correct resolution of the control riddles. PPVT scores were significantly related to performance on both types of riddles but not to reading ability. Thus, while IQ is related to the resolution of riddles in general, reading ability has a special relation to riddles which manipulate phonemes and morphemes, consistent with the morphophonological nature of English orthography.

Using Children's Humor to Clarify the Relationship Between Linguistic Awareness and Early Reading Ability

A certain degree of linguistic awareness is important in the reading of any orthography because readers need to have access to the linguistic units which their orthography represents (Liberman, Liberman, Mattingly, & Shankweiler, 1980). However, the type of awareness which is required will be determined by the type of orthography and which aspect or aspects of the spoken language that particular orthography represents. English, the language of concern in this study, uses an alphabet to represent individual sound segments, or phonemes. In alphabetic systems, the words on the page are related to the words in the reader's vocabulary by correspondences between symbols and phonemes. In order to appreciate these correspondences, the reader must have an awareness of phonemes (Liberman, Shankweiler, Fischer, & Carter,1974).

The decoding of printed words into their spoken counterparts is relatively straight-forward for readers of such alphabetic systems as Spanish where spelling is shallow in having consistent relations between phonemes and letters. This consistency allows non-Spanish speakers to decode Spanish with accurate, if accented, pronunciation whether or not they understand the words they are reading. All they need to appreciate are the phoneme/letter correspondences and the rule for stress placement.

The same cannot be said of English, for although English uses an alphabet, its spelling is notorious for its large number of exception words. It has been argued (Smith, 1985) that reading success in English cannot be attributed to decoding ability because the correspondence between spelling and pronunciation has become so inconsistent and arbitrary. One reason why English orthography might seem more 'arbitrary' than Spanish is that it is a "deeper" level of transcription that is 'morphophonological' instead of strictly alphabetic (Chomsky, 1964). Many words which are not spelled phonetically are principled exceptions in which a sequence of letters preserves a deeper morphological relatedness which is obscured on the surface by such things as vowel alterations (as in divine/divinity and heal/health) or by assimilation of voicing (as in the 's' in dogs/cats and the 'ed' in cooked/cleaned) (see Chomsky & Halle, 1968 for further discussion of these rules).

Following on the logic that readers need to be aware of the units of language which their orthography transcribes, we might predict that success in learning to read English would depend both upon phoneme awareness and upon morpheme awareness. To date, however, research on the relation between linguistic awareness and reading ability has focused on phoneme awareness. It has been speculated that phoneme awareness might be difficult to acquire because, unlike syllables or words, phonemes have no independent acoustic reality, only psychological reality (Liberman, A. M., 1970; Liberman, I. Y., 1982). There is evidence which indicates

that many pre-literate children (see, for example: Liberman, et al., 1974; Stanovich, Cunningham & Cramer, 1984) and adults (Morais, Cary, Alegria, & Bertelson, 1979) have problems with tests that require them to count, delete, or otherwise manipulate phonemes. It has been shown that deficiencies in phoneme awareness are critically associated with reading problems in both children (Liberman, Shankweiler, Blachman, Camp, & Werfman, 1980; Stanovich, Cunningham, & Cramer, 1984) and adults (Read & Ruyer, 1985). Longitudinal studies of children (Mann, 1984; Perfetti, 1985;) have further shown that a lack of phoneme awareness is a predictor of early reading problems (For further references see Mann & Brady, 1988).

As for the relation between morpheme awareness and reading ability, there is much less evidence. It has been speculated that awareness of derivational relationships shapes sensitivity to English spelling patterns (Carlisle, 1987). However, some have noted that awareness of derivational morphology is more likely to be a product of formal education and a correlate of mature reading skill than a predictor of early success (Derwing & Baker, 1979). Even more relevant than derivational relatedness are the morphological boundaries within words. For example, recognition of morphological boundaries is essential in determining how to decode the potential digraphs th, ph, and sh in pairs such as father/fathead, graphic/shepherd, and bishop/mishap (Smith, 1985). The presence of derivational sufffixes further determines which syllable will be stressed and, as a consequence, which

vowels will or will not be reduced as in phótograph/photógrapher/photográphic. There is evidence that the acquisition of inflectional morphology may be abnormal in learning-disabled children (Wiig, Semel, & Crouse, 1973), whose use and awareness of inflections is often deficient (Vogel, 1977). There is also evidence that some of the variance in the reading performance of normal children can be attributed to differences in inflectional ability (Brittain, 1970).

In this study we have examined both phonemic and morphological awareness in relation to reading ability. As a control, we have also examined some other types of metalinguistic awareness which are not directly relevant to the decoding of the English orthography, namely awareness of syntactic structure and pragmatic assumptions. Our methodology involves using childen's humor as a probe of each kind of awareness. Although this methodology is not entirely new, the few extant studies utilizing this approach were confounded by methodological problems and the absence of necessary controls as well as a failure to recognize or use the humorous materials most appropriate to the purposes of the study. We proceed now with a discussion of humor and the unique advantages that children's linguistic jokes and riddles have as a tool for accessing linguistic awareness.

Bibliographies of humor studies (McGhee, 1980; Treadwell, 1967) show that research on humor has covered a vast range of topics. Researchers have considered the place of humor in the curriculum and in psychotherapy. They have probed its

relationship to intelligence, memory, cognitive development and strategies, creativity, ethnicity, birth order, sex and age differences, delinquency, anxiety, psychosis, aggression, and family and racial conflict. Our interest in humor relates to the fact that humor appreciation can turn on the ability to detect linguistic ambiguity. Since detection of ambiguity requires linguistic awareness (Shultz, 1974), sensitivity to linguistic humor can offer a probe to linguistic awareness provided that appropriate materials and methodology are in use.

Of the many theories, principles, and concepts to emerge from the study of the development of humor, three are most relevant to a discussion of the relationship between linguistic awareness and children's humor: 1) the Mastery Concept, 2) the Cognitive-Congruency Principle, and 3) the Incongruity and Resolution Theory. Concerning the Mastery Concept, Kris states that in order to experience humor,

> a preliminary condition is complete control over the function in question. An absurd movement on the part of another person will seem funny to a child only when it has itself mastered the movement. At a later stage of development, it will laugh at a mistake in thinking only when its own powers of thought are firmly established. (p. 32 in McGhee, 1979)

Wolfenstein (1954) uses the Mastery Concept to explain the perennial popularity of the joking riddle[1] with children between the ages of six and eleven. Two examples of the joking riddle appear below:

1) Q. Why did the moron take a hammer to bed?
   A. He wanted to hit the hay.
2) Q. Why did the moron take a ladder to the ball game?
   A. He heard that the Giants were playing.

Wolfenstein observes that "the riddle form stresses the issue of who knows and who doesn't. The figure of the moron represents all that the child repudiates is his aspirations to smartness" (pp. 93-94). In contrast to the moron, children are rapidly gaining mastery and this makes them both desire mastery and be preocccupied with "smartness" versus "dumbness." Our present interest in this type of riddle is that the moron's shortcomings are singularly cognitive/linguistic in nature. He cannot grasp

the non-literal uses of language, in contrast to the child who is rapidly mastering communicative competence throughout the elementary school years.

The Cognitive Congruency Principle was recognized by Zigler, Levine, and Gould (1966, 1967), who noted the relationship between children's level of cognitive mastery and their appreciation of humor. The Cognitive Congruency Principle is based on Zigler et al.'s finding that appreciation of humor is greatest when the joke is based on the level of development which the child has most recently mastered; the mirth response decreases when the incongruity is too easily resolved. McGhee (1979) concurs there is an optimal level of cognitive challenge that maximizes "funniness." Incongruity which is too readily resolved is thought to be boring, while resolution which requires too much thought becomes work instead of fun. It is significant that linguistic jokes and riddles, which constitute the most numerous and popular category of humor for children between the ages of about six and twelve, are no longer considered funny after about the age of twelve (Shultz, 1974). This would seem to indicate that the various communicative skills involved in them continue to develop up to about age twelve and that their mastery is complete at that time.

McGhee (1971) is responsible for the Incongruity and Resolution Theory; he notes that there are two aspects to humor: the recognition of an incongruity and the discovery of its resolution. The recognition of incongruity depends on prior

cognitive mastery which leads to expectations about how things are 'supposed to be'; incongruity can exist only when an object or event is not 'the way it is supposed to be.' There is some disagreement as to the earliest age at which children appreciate the humor which involves the resolution of an incongruity. Shultz (1974) sets the age between seven and eight while Pien and Rothbart (1976) argue that children as young as four prefer resolved humor over unresolved humor is the material is sufficiently simple.

Basing their work on the Mastery Concept, the Cognitive Incongruity Principle, and the Incongruity and Resolution Theory, Shultz and associates (Shultz, 1972, 1974; Shultz & Horibe, 1974; Shultz & Robillard, 1980) were the first the use linguistic jokes and riddles to investigate the development of sensitivity to linguistic ambiguity. They found that it developed from phonological to lexical to surface structure to deep structure ambiguities. Jokes and riddles which turned on linguistic ambiguity were described as "metalinguistic" because awareness of 'structure as separate from meaning' is the crucial ability necessary for resolution of the incongruities. However, none of the ambiguities used in these pioneering studies involved linguistic units smaller than the word; no joke or riddle turned on the fact that words can be broken down into such units as phonemes and bound morphemes. Also, no attempt was made to investigate the relationship of performance on jokes and riddles to sex, age, intelligence, reading ability, or any variables

other than grade level, and no other categories of humor were used as controls.

It was first observed by Fowles and Glanz (1977) that the abilities necessary for resolving linguistic humor, particularly the manipulation of language as an object, might be critically associated with success in earning to read. To test this prediction they measured the ability of a small, heterogenous group of elementary school children (i.e., 14 first, second, and third graders) to retell and explain linguistic riddles. They used examples from three of the four categories identified by Shultz and associates. However, they excluded 'phonological'[2] and made the important innovation of including a newly identified category which they labeled 'metalinguistic' because resolution depends entirely on an explicit "shift in attention from content to structure" (p. 438). Their example:

Q. What comes at the end of everything?

A. The letter g.

This was the first study to include humor turning on letter/phoneme sized units. However, no controls were used, and the subjects were identified only by grade level and by the classroom teachers' identification of the children into two broad groups: "below grade level," and "at or above grade level." No statistical tests were performed on the scores, but the authors observed that, in general, the children's ability to explicate humor appeared to be more a function of their reading level than their grade level (i.e., age).

Hirsh-Pasek, Gleitman, and Gleitman (1978) improved and expanded the classification of materials by redefining Schultz's '<u>phonological</u>' humor as humor which turns on 'minimal pairs' of words which differ by one phoneme (e.g., cracker/quacker). They further added the categories of <u>morpheme boundary</u> (e.g., engineers/engine ears) and <u>morpheme boundary with phonological distortion</u> (e.g., Let's hope/Let's soap). Hirsh-Pasek et al. tested the ability of children to explicate 30 examples of the different categories of linguistic humor using four boys and four girls selected from each of of grades 1-6. Children were choosen on the recommendation of the school reading specialist who chose two boys and two girls at each level as "very poor" readers and two boys and two girls at each level as "very good" readers. Percentage of errors in explication were analyzed in terms of the children's reading group, sex, grade level, and humor category, and this revealed a significant relationship of both grade level and reading ability to explication ability, with females outperforming males at all levels. However, the sample size did not permit any rigorous statistical analysis. Moreover, the researchers did not administer any form of reading test to validate reading ability or offer any control for IQ. There was also no control for the possibility that subjects' differences turned on sense of humor, comprehension of the instructions etc., rather than on sensitivity to 'linguistic humor,' per se.

The studies of Shultz et al. (1974; 1980) and Hirsh-Pasek et al. (1978) demonstrate a concept which is hardly controversial,

namely, that skill in reading English is related to another activity which requires linguistic awareness and general verbal skill. If children's humor can be put to no greater use than this, then it might be dismissed as a pleasant but insignificant addition to the reading research literature, given the wealth of information that relates phoneme awareness and language processing skills to early reading ability (see Mann & Brady, 1988 for a review). The present study is designed to investigate the more subtle issue of whether early reading skill has a special relationship to phoneme and morpheme awareness as compared to other types of awareness. Children's humor will be used in such a way as to add a new, more controlled source of evidence about the different types of 'linguistic awareness' and their relationship to IQ and reading ability.

There are at least four advantages to using humor appreciation as a probe of children's linguistic abilities. The first is ecological validity. Linguistic riddles are a familiar and naturally occurring part of children's culture; even in a laboratory setting, humor is "real language" in that it has intent, as opposed to some of the citation forms or "sample language" normally used for language assessment. This means that the child's attention when listening to the riddles is apportioned between content and form in approximately the same way that it would be when listening to the same material in a non-test setting. Thus linguistic humor has the unique advantage of automatically focusing attention on form for the purpose of

resolving the humor. In contrast, such linguistic awareness tasks as phoneme counting or phoneme deletion call attention to form in a way that is considerably more artificial and unnatural.

A second advantage to using humor appreciation is that it requires no training and does not place direct emphasis on the awareness being tested. If training is necessary for testing, such as when the child memorizes a series of items which illustrate how to count the 'sounds' in words, the ability being measured is altered in the process of the experiment (Read, 1978). A third advantage is that humor is inherently more interesting and pleasant for both the subject and the experimenter. The children are motivated and cooperative because performance of the task is its own reward.

A fourth advantage to using humor appreciation is the availability of a suitable control. Types of humor which do not concern the units of interest - phonemes and morphemes, in this case - can be used to control for task factors such as the child's ability to understand the instructions. Similar controls are not readily available for such tasks as phoneme manipulation. For example, the ability to count phonemes or syllables has been compared to the ability to count the angles in visual stimuli (see Mann, 1986), and the ability to delete phonemes has been compared to the ability to delete musical notes (Morais, Bertelson, Cary, & Alegria, 1986), but the parallels are less than ideal. We may much more appropriately compare humor

involving phonemes and morphemes with humor involving ambiguous words, syntactic structure, or 'common sense.'

Unfortunately, there are also some problems involved with using humor. The most serious one is the difficulty of valid measurement. The two dimensions usually measured are the degree of enjoyment resulting form the humorous item and the ability of the subject to resolve the humor in the intended way. One commonly used method of measuring the degree of enjoyment is a 'mirth response scale' involving subjective evaluation by the experimenter together with a scaled response from the subject. Successful resolution is most frequently verified by the method of explication.

A typical mirth response scale is the following one employed by Zigler, Levine, and Gould (1966, p. 511):

0 = negative response (grimace, etc.)
1 = no response (blank face, etc.)
2 = half or slight smile
3 = full smile
4 = laugh

The obvious problem with a scale of this type is that children and adults alike, both in and out of test situations, smile and laugh for a number of reasons other than mirth. These include nervousness, embarrassment, and a desire to please. This measure is usually used in conjunction with an evaluation metric which requires the subject to rate the humorous item on a four- or five-point scale ranging from "Not funny" to "Very funny." If these scales produced valid measurements, the scores of the two should correlate with each other since they proport to measure

the same thing. However, it is not uncommon for a subject to laugh out loud on hearing a particular test joke and then insist that it was "Not funny" in the least, or to maintain a straight face and rate the item as "Very funny." The experimenter does not know which, if either, score represents the child's enjoyment of the joke.

The Cognitive-Congruency Principle can be used to account for some of this discrepancy through the use of explication measures which involve asking the subject to tell what made the item funny. According to this principle, if the joke or riddle is too easily resolved, the child should be able to rate the item and explain how it works but should display little or no mirth. If the joke or riddle is too difficult to resolve, the child should be unable to explain how it works and should again show no mirth. If a child displays a high degree of mirth and is able to explain the joke, this should indicate that the humorous item is near the child's optimal level of cognitive-congruency.

The five-point scale used by Hirsh-Pasek et al. (1978) is an example of such an explication measure. Although this represents an improvement over the use of the mirth response alone, this method tends to misrepresent the understanding of those children who are less articulate or shyer than their classmates. Explication scores do not correlate well with either mirth response or evaluation scores, but are useful, particularly at the pilot study level[3], in that they can reveal some of the unexpected ways in which children interpret humorous material.

It appears that humor is so fragile that it withers in the face of direct measurement and analysis. Ecological validity, together with the other advantages of using humor appreciation, evaporate under these conditions. Gaylin (1986) observes that humor analysis is "heavy-handed work" and that "to try to say why a joke is funny or why fun is fun almost ordains a certain resentment against the analyst." (p. 127). Only subtle and indirect approaches have a chance of success. However, some of the measurement problem can be simplified greatly by the realization that the degree of appreciation is irrelevant if one's only concern is whether or not the child can resolve the humor in the intended way.

Based on this consideration, we have developed a forced-choice task in which the child is presented with the question portion of a riddle and asked to select the better (i.e., the 'funnier') of two possible punch lines. Our materials are contructed such that each correct choice presents and resolves an incongruity while answering the question; each incorrect choice answers the question of the riddle, yet contains an unresolved incongruity. For example, one of the riddles which turn on morphological awareness asks, "If a dog lost his tail, where could he get a new one?" The correct answer, "At a retail store," presents not only the ridiculous image of a tail-less dog with a shopping cart but also presents the opportunity to discover that even though "retail" doesn't mean "tail again," it certainly could, whereas the alternative answer, "At a pet

store," presents the ridiculous image of the shopping dog, but coupled with the less-than-satisfying associations of dogs being pets, and pets' needs being met by pet stores.

Although the chance factor could have been reduced by offering several incorrect choices, we chose to employ a two-alternative forced choice design since the use of more alternatives would have placed a large burden on linguistic short-term memory. This type of memory is a well-documented problem for poor readers (see Mann & Brady, 1988 for review). The memory demand could have been reduced by presenting the materials in written form, but written presentation would have handicapped the poor readers and confounded any conclusions which we might have drawn from the results. Thus we decided to employ spoken presentations with only two alternatives.

Our design called for two categories of riddles: a set of 'phoneme/morpheme' riddles and a set of 'control' riddles. The phoneme/morpheme category consisted of 10 riddles requiring access to either phonemes, morphemes, or both (See Appendix A). The additional set of ten 'control' riddles was included to control for task factors such as attention, 'sense of humor,' etc. might be related to reading performance. Resolution of these riddles does not require access to units smaller than the word (see Appendix B). The morphophonological nature of the English spelling system predicts a relationship between resolution of the phoneme/morpheme riddles and reading ability but not between the control riddles and reading ability.

Method

Subjects

Subjects were 48 second-grade children from a predominantly white, middle-class, public school in Costa Mesa, CA. Parental consent forms were sent home with all of the the second-graders in the school and approximately 52% returned forms with the required signature. These subjects were divided almost evenly between boys (n=25) and girls (n=23). Their mean age was 8;3 (range 7;1 - 9;3), with the boys being slightly older than the girls (mean age boys = 8;5, mean age girls = 8;2). According to their teachers, 21 of there children were in the highest classroom reading groups, 17 were in the middle groups, and 9 were in the lowest groups.

Materials

Three types of ability were measured: reading, IQ (receptive vocabulary), and humor resolution. Reading ability was measured using the Word Identification and Word Attack subtests of the Woodcock Reading Mastery Tests, Form A (Woodcock, 1973). In the Word Identification Test subjects are asked to read aloud individual words of increasing difficulty (**is**, **come** . . . **picayune**, **beatitude**). The Word Attack Test consists of 50 nonsense items of increasing complexity (**iff**, **bim** . . . **bafmotbem**, **nolhod**) which test the subjects' phonetic decoding ability. Words for both tests are presented on large white cards in blocks of ten items. Both tests are discontinued after the

subject makes five consecutive errors. Also available was the teacher's evaluation of each child based on his or her placement in high, middle, or low reading groups in the classroom.

The Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn, 1981), an individually administered, norm-referenced, wide-range, power test of hearing vocabulary, was administered to all the children as a measure of general intelligence. PPVT scores correlated with full scale scores for the Wechsler Intelligence Scale for Children (WISC) with a median value of .64 over 66 correlations and with scores from the Stanford-Binet with a median value of .62 over 72 correlations. Additionally, vocabulary is the best single index of academic achievement (Dale & Reichert, 1957).

The ability to resolve humor was tested with 20 riddles selected from a poopular monthly children's magazine which features the favorite jokes and riddles of their readers. Half of these were phoneme/morpheme riddles which appear in Appendix A), and half were 'control riddles' (which appear in Appendix B). Since both types of riddles were selected from the same issues of the same publication, we assume that both types of riddles would be equally familiar to our subjects. We produced a 'foil' answer to each riddle which answered the riddle's question but failed to offer a resolution to the ambiguity.

Phoneme/morpheme riddles. The resolution of two of these riddles requires phoneme manipulation: reversal and segmentation (See 1-2 in Appendix A). In three of the riddles, part of the

task is segmenting the end phoneme, but the child must also appreciate morpheme structure of real word pairs (3-5 in Appendix A). Two riddles create a nonsense variation of a multisyllabic word by substituting a morpheme for one of its syllables. The resolution of these requires the recognition of the minimal-pair relationship between the substituted and original parts of the word. It also requires segmenting the first phoneme in the sequence (see 6-7 in Appendix A). Three riddles take two genuine morphemes and reinterpret a word in terms of its morpheme structure (see 8-10 in Appendix A).

Control riddles. Four of these riddles represent categories previously classified as linguistic humor (Shultz, et al., 1974). Three of these turn on lexical ambiguity (see 1-3 in Appendix B), and one turns on syntactic ambiguity (see 4 in Appendix B). While this awareness is related to general comprehension skills and language maturity, it should not be particularly important for the morpho-phonological aspect of reading. Five of the remaining control riddles turn on violating the pragmatic assumptions implicit in the questions (see 5-9 in Appendix B) and one turns on the inherently amusing pecularities of two animals (see 10 in Appendix B).

For the purpose of testing, the riddles were recorded onto magnetic tape. The order of the 10 test and 10 control riddles was randomized with the constraint that five of each category occur in each half of the test sequence. The correct answer was

heard first in half of the examples of each category of riddles, and the foil was heard first in the remaining half.

Procedure

Each child was tested individually in a quiet room at the school during May. The tests were presented in the following order: PPVT-R, Word Identification, Word Attack, and riddle resolution. The procedure for testing riddle resolution was as follows: Each child was first asked if he or she liked jokes and riddles. (All answered in the affirmative.) It was explained that a tape would be played that contained 20 riddles, each riddle followed by two possible answers. The child was instructed to select the answer that made the riddle the funniest. It was explained that the tape could be made to pause or that any riddle could be played a second time if the child wished. Several children did request that one or two riddles be repeated.

Results

Our first interest was to discover whether children's reading ability is related to their performance on the phoneme/morpheme riddles more than to their performance on the control riddles. To this end we first computed an ANOVA between reading ability (good, average, and poor as a grouping factor) and type of riddle (phoneme/morpheme and control). Our measure of the children's reading ability was the sum of each subject's scores on the two Woodcock subtests (Word Identification + Word Attack). On the basis of this composite reading score (WC) three

groups were created: 'poor' readers, who scored more than one SD below the mean (n=9), 'average' readers, who were within one SD of the mean (n=29), and 'good' readers, who scored more than one SD above the mean (n=10). We preferred this grouping to the high/middle/low grouping provided by the classroom teachers because teacher ratings include comprehension and possibly such subjective criteria as classroom citizenship. The correlation between this classroom reading group assignment and the WC grouping described above was significant, $r(48)=.61$, $p < .01$, and neither teacher ratings nor WC was related to IQ ($p > .3$).

As can be seen in Table 1, there was no main effect of reading group membership or of riddle type. Better readers did not show better resolution, in general, and phoneme/morpheme riddles were no more difficult than the control riddles in general. However, reading group showed a significant interaction with riddle type, $F(2,47) = 5.804$, $p < .01$. Performance on the phoneme/morpheme riddles was related to reading ability, with better readers showing better resolution. In contrast, performance on the control riddles was not related to reading ability. A separate ANOVA considered the scores of children when they were grouped according to Peabody IQ with the same SD criteria used for reading groups. As can be seen in Table 2, there was a significant main effect of IQ level, $F(2,47) = 4.715$, $p < .05$, but no main effect of riddle type and no interaction (p

> .5). Children with higher IQ scores tended to achieve higher resolution scores on both types of riddles.

Table 1 about here

Table 2 about here

Correlational and multiple regression analyses corroborate the results of the ANOVA. We found a significant correlation between performance on the phoneme/morpheme riddles and reading ability (WC), $r(48)=.40$, $p < .01$, but no significant relationship between performance on the control riddles and reading ability ($r(48)=.08$, $p > .3$). In contrast, we found Peabody IQ was significantly related to performance on the control riddles, $r(48)=.32$, $p < .05$, but not to reading ability ($r(48)= .008$, $p > .5$). Performance on phoneme/morpheme riddles was also significantly correlated to IQ, $r(48)=.39$, $p < .01$, and to performance on control riddles, $r(48)=.36$, $p < .01$.

Neither age nor sex was significantly correlated (point-biserial) with the reading measure or with IQ. However, age was significantly correlated with performance on the phoneme/morpheme riddles, $r(48) = -.31$, $p < .05$, with the younger children performing better than their older classmates but not with performance on the control riddles ($r(48) = -.11$, $p > .23$). (Second-grader children are typically eight years old. The youngest class members, several of whom had just recently turned seven, were in second grade because of their high academic

skills. Conversely, several nine-year-olds were still in this class rather than in the third grade because of their low academic skills.) Sex, on the other hand, correlated significantly with performance on the control riddles, $r(48) = -.25$, $p < .05$, with males outperforming the females, but not with performance on the phoneme/morpheme riddles. On the phoneme/morpheme riddles, the females outperformed the males, but not significantly so ($r(48) = .10$, $p > .24$).

On some of our materials, it is clear that better spellers would have an advantage; being able to spell 'moo,' 'school,' and ' smiles' most assuredly would aid resolution of riddles #1-3 in Appendix A. Better readers might be better spellers, and this could possibly explain our results. In order to control for the possibility that a 'spelling strategy' could have caused reading-related performance differences, we created a new variable, NOSPELL, by eliminating the scores on riddles #1-3 and discovered that the advantage that the good readers had on the phoneme/morpheme riddles was not dependent on the use of a 'spelling strategy.' We continued to find a significant correlation between NOSPELL and reading ability (WC), $r(48) = .35$, $p < .001$, thus discounting a pivotal role of any spelling strategy, per se. The inter-correlation of all variables is presented in Table 3.

Table 3 about here

Since IQ was significantly related to performance on both types of riddles, age was significantly related to performance on the phoneme/morpheme riddles, and sex was significantly related to performance on the control riddles, we used multiple regression as a final analysis to determine the independent contribution of reading ability to the resolution of each type of riddle, above-and-beyond the contribution of these other three variables. The results of these analyses are presented in Table 4. Reading ability explained a significant amount of variance in the performance on both the full set of ten phoneme/morpheme riddles (15.4%) and on the reduced NOSPELL set (11.3%) beyond that accounted for by sex, age, and IQ. However, reading ability only accounted for a nonsignificant 5.3% of the variance in the performance on the control riddles beyond that accounted for by sex, age, and IQ.

Table 4 about here

To gain a better appreciation of the separate contribution of phoneme and morpheme awareness, we have examined performance on individual riddles. There is clear evidence that both phoneme and morpheme awareness are related to reading ability. Figure 1 summarizes the mean performance of each reading group on individual riddles. On nine of the ten phoneme/morpheme riddles good readers surpassed average readers, who in turn surpassed poor readers on nine out of ten phoneme/morpheme riddles. The

riddles which most clearly distinguished children in the different reading groups were #3 ("smiles"), #4 (barking lot), #8 (tear-able paper), which require sensitivity to both phonemes and morphemes, and #10 (retail store), which requires only sensitivity to morphemes.

In contrast, the relation between the groups of children is unsystematic in the case of the control riddles. The poorer readers actually surpassed the better readers on three of the riddles; they surpassed the average readers on seven of the riddles.

Figure 1 about here

Summary and Conclusions

This study provides a new line of evidence which supports and, more importantly, qualifies the well-established hypothesis that awareness of linguistic units is related to early reading success. In agreement with the findings of Fowles and Glanz (1977) and Hirsh-Pasek et al. (1978), we have found a relationship between performance on jokes and riddles which turn on awareness of linguistic units and reading ability. However, we have shown that the relation depends upon the type of unit being manipulated; jokes which turn on phoneme or morpheme awareness are consistently related to reading ability, whereas those which

turn on sensitivity to larger units are not. This is demonstrated by the contrast seen in Figure 1; the clear relationship in the upper panel between reading ability and riddles which require awareness of either phonemes or morphemes or of both, and the lack of systematic relationship in the lower panel between reading ability and awareness of either lexical ambiguity (control riddles #1-3) or syntactic ambiguity (control riddle #4).

We had predicted a special relationship between reading ability and phoneme/morpheme riddles, based on considerations about the English orthography. As English transcribes both phoneme- and morpheme-sized units, we anticipated finding that children who are aware of phonemes and morphemes would tend to be better readers of English. Some of our riddles concerned phoneme awareness (i.e., 1 and 2 in Appendix A), some concerned morpheme awareness (i.e., 8-10 in Appendix A), and some concerned both (i.e., 3-7 in Appendix A). All three types of riddles succeeded in distinguishing good and poor readers; hence we conclude that both phoneme and morpheme awareness are related to reading ability.

The many studies which indicate that better readers will be more aware of phonemes (for references see Mann & Brady, 1988) made it highly likely that better readers would be more able to resolve those riddles which reversed or segmented phonemes. What was less clear from the literature was whether or not better readers would also be more aware of morphemes. Thus our more

important result is the discovery that riddles which turned on morpheme structure made some of the clearest distinctions between children who differed in reading ability (i.e., 3, 4, 8, and 10 in Appendix A).

These findings are in agreement with Chall (1979, 1983) who proposes six stages of reading development which can be grouped on the basis of two qualitatively different tasks, mastering the medium and mastering the message. The task for early readers, such as those in our population, involves learning to master the medium. They must have the abilities required to decode the orthography, that is, they must have phoneme and morpheme awareness. Hence the significant relation between these types of awareness and early reading ability. Starting at about the fourth grade, reasonable fluency in decoding is assumed, and the emphasis shifts to mastering the message. This task of comprehension is aided by awareness of semantic, syntactic, and pragmatic ambiguities such as those found in our control riddles. However, these types of awareness are not relevant to the earlier and qualitatively different task of decoding. Thus the lack of significant relationship between them and early reading ability.

Having noted the relation between riddle resolution and reading ability, we should comment upon the contribution of IQ to our results. First of all, while reading ability was specifically related to performance on the phoneme/morpheme riddles, IQ was related to performance on all types of riddles. We suggest that IQ is equally related to both the phoneme/morpheme and control

riddles because it enables that conceptual leap from the realization of an incongruity to the discovery of its resolution in a new association between two familiar but never before associated items. This leap is both the resolution and the pleasure of the humor, two notions which are the essence of the Mastery Concept and the Incongruity and Resolution Theory which we described in the introduction. It should come as no surprise that 'mastery' and 'resolution of incongruity' relate to general intelligence, and this is in agreement with previous findings that comprehension (but not necessarily mirth or appreciation) of humor is positively correlated to intelligence (Zigler et al., 1966; McGhee, 1971; Prentice & Fathman, 1975; Pinderhughes & Zigler, 1985).

However, the conceptual leap made possible by IQ is merely a prerequisite for tackling riddles; it is not sufficient for the resolution of any particular riddle. Final resolution rests upon the association itself, and for the phoneme/morpheme riddles this requires some sensitivity to the units being associated. Thus we see a specific relation between reading and phoneme/morpheme riddles in addition to the more general relation between riddles and IQ. The lack of correlation between reading ability and IQ and the results of the multiple regression analysis imply that early reading ability (i.e., decoding ability) is somewhat independent of general intelligence. This finding is consistent with other observations (Liberman, 1982; Mann, 1984, 1986; Stanovich, Cunningham, & Freeman, 1984). What is most important

is the fact that reading was related to performance on the phoneme/morpheme riddles but not to performance on the control riddles. As can be seen in Table 4, IQ and reading ability made separate contributions to the resolution of the phoneme/morpheme riddles. In contrast, only IQ contributed significantly to the resolution of the control riddles; reading ability did notmake a separate, significant contribution.

We have noted that many of the riddles were already familiar to some of the children. In the materials section we mentioned some reasons for our assumption that familiarly should be approximately equal across both types of riddles. We did not feel it necessary to directly control for familiarity because we do not feel that familiarity is a factor in resolution ability. In support of this point we note the observation (Hirsh-Pasek, Gleitman, & Gleitman, 1978) that young children become familiar with the socio-linguistic rules of riddle-telling very early and enjoy demonstrating their competence with the format before they are capable of appreciating the content. Thus, a five-year old told the following 'riddle' (Hirsh-Pasek, Gleitman, & Gleitman, 1978):

> Child: What has a trunk and four wheels?
>
> Us : I don't know. What has a trunk and four wheels?
>
> Child: A car! (hilarious laughter) (p. 97)

The child had obviously heard the the riddle somewhere and could recall the question portion but not the punch line (which most

likely involves an elephant or perhaps a tree) because he could not make sense of it.

If a child lacks the ability to resolve the incongruity, then any answer that conjures up a sufficiently incongruous image, or, as in the example above, that even satisfies the requirements of the format, is just as satisfactory and amusing to him as any other answer. In this situtation, and in the context of our task, if the riddle and its answer were already familiar, a novel incongruous answer might be even more appealing simply because it is novel.

The task used in our study was to "select the answer that answers the question of the riddle in a funny way." Children were not asked to "select the correct (i.e., known) answer." If this had been the task, then the child should select the answer that he "knew," but didn't really understand, to a familiar riddle. One might argue that some children interpreted the task this way or for some other reason favored the familiar answer to a familiar but unresolved riddle. Nevertheless, if the child is capable of the resolution, then it is irrelevant whether or not the material is familiar; the child should select the correct answer in both cases. The only difference is that she or he might select it a bit faster for a familiar riddle. If the child is not capable of the resolution, she could pick either answer for an assortment of reasons. This means that performance is approximately the same as it would be on an unfamiliar riddle that the child cannot resolve, that is, at chance.

In summary, we have successfully demonstrated that children's humor can be a satisfactory and, in many ways, a superior tool for accessing the relation between different aspects of linguistic awareness and early reading success. Our next steps would be to investigate the performance of first grade and kindergarten children on an expanded set of riddles which turn entirely on phoneme awareness or on morpheme awareness alone in order to learn about the age of onset of phoneme versus morpheme awareness. Also, fourth through sixth grade children should be tested on riddles of the type used in this study to discover when and if sensitivity to semantic, syntactic, and pragmantic ambiguity contribute to more advanced reading ability when it is defined as comprehension.

Several other applications for our methods and materials also become possible. Since our methodology does not require that the subjects read, it should be particularly appropriate for use in testing severely dyslexic children. It might also provide a new means of investigating the linguistic awareness of illiterate adults. Adults who cannot read an alphabetic system have been said to be unaware of phonemes because they have performed poorly on phoneme deletion tasks (Morais, et al., 1979; Read, Zhang, Nie, & Ding, 1986). Riddle resolution can offer another means of evaluating this claim and extending the concern to morpheme awareness as well as phoneme awareness.

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Author Notes

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Appendix A

Phoneme/morpheme Riddles.
(The correct answer for each is a.)

1. What goes "oom oom?"

   a. A cow walking backwards.
   b. An old vacuum cleaner.

2. What comes at the end of school?

   a. The letter L.
   b. Summer vacation.

3. What's the longest word in the language?

   a. "SMILES" because there's a mile between the first and last letters.
   b. "TRAINS" because it has more cars than you can count.

4. Where should you leave your dog when you can't take him into a restaurant?

   a. Outside in the barking lot.
   b. At home in the doghouse.

5. What did the sick baby banana say to the mother banana?

   a. I don't peel good.
   b. I'm yellow all over.

6. Where do wasps go when they get hurt?

   a. To the waspital.
   b. Back to their nest.

7. What do ghosts use to wash their hair?

   a. Shamboo.
   b. Invisible soap.

8. What kind of paper is easiest to rip?

   a. Tear-able paper. (terrible)
   b. Tissue paper.

9. What kind of witch lives in the desert?

   a. A sand-witch. (sandwich)
   b. A cactus witch.

10. If a dog lost his tail, where could he get a new one?

    a. At a re-tail store.
    b. At a pet store.

Appendix B

Control Riddles

(The correct answer for each is a.)

1. What should you do if you meet a blue monster?

   a. Try to cheer him up.
   b. Run as fast as you can.

2. What did one math book say to the other math book?

   a. I've got a lot of problems.
   b. I've got a lot of multiplication tables.

3. What do you call a rabbit with fleas?

   a. Bugs Bunny.
   b. A scratching rabbit.

4. What is the last thing you take off when you get in bed?

   a. You take your feet off the floor.
   b. Your bathrobe.

5. What's the best way to get a rug out from under an elephant?

   a. Wait until he leaves.
   b. Wait until he falls asleep.

6. Why did the cowboy ride his horse into town?

   a. The horse was too heavy for him to carry.
   b. His feet were tired.

7. When can you drop a full glass without spilling any water?

   a. When the glass is full of milk.
   b. When the glass lands on a pillow.

8. What two things can you never eat for breakfast?

   a. Lunch and dinner.
   b. Chicken and jello.

9. What do elephants have that no other animals have?

   a. Baby elephants.
   b. Trunks.

10. What's worse than a giraffe with a sore throat?

    a. A catepillar with sore feet.
    b. A dog with a sore tail.

Footnotes

[1] There are two broad categories of children's riddles: puzzle and joking. In puzzle riddles, which include brain teasers, the "jokee" is expected to figure out the answer based on the information provided in the question part of the riddle. In joking riddles the proper response is always "I don't know. What?" because the answer is ridiculous. It can be rendered sensible (i.e., resolved) after it is heard, but not calculated or guessed in advance.

[2] The classification system, which was first presented in Shultz and Pilon (1973), in questionable in some respects. They define phonological ambiguity as involving pairs of words with different spelling and either identical pronunciations (pair/pear) or similar pronunciations (line/lion) and lexical ambiguity as involving words which are identical in both spelling and pronunciation ("club" - large stick/"club" - social organization). This distinction based on spelling seems inappropriate considering that one of his subject groups was comprised of six-year olds and that the stimuli were presented orally.

[3] For example, in a pilot study that preceeded the present study, two eleven-year old boys heard the following riddle, the resolution of which requires sensitivity to bound morphemes:

Q. If a dog lost his tail, where could he get another one?

A. At a retail store.

Both boys laughed, and both gave it the highest rating of "Very funny." But when asked why the riddle was funny, the responses revealed totally different treatments of the material. The first boy responded that the riddle was good "because the store was a re-TAIL store" (emphasizing the two morphemes). He added that the boy could also have gone to a "tail-er" (tailor). The second boy responded that the riddle was funny because "everyone knows that dogs don't have any money." When asked if the riddle would still work if the dog went instead to a hardware store or a pet store for his new tail, the second boy said that "Yes, both of those are really funny, too." He was amused simply at the unresolved incongruity of a dog going shopping.

Table 1

Mean Number of Correct Responses for Test and Control Riddles by Reading Group

	Riddle Type		
	Phoneme/morpheme	Control	Mean
Low WC Group	4.89	6.89	5.89
Middle WC Group	6.48	5.93	6.21
High WC Group	7.50	7.40	7.45
Mean	6.40	6.42	6.41

Table 2

Mean Number of Correct Responses for Test and Control and Test Riddles by Peabody IQ Group

	Riddle Type		
	Phoneme/morpheme	Control	Mean
Low IQ Group	4.89	5.78	5.34
Middle IQ Group	6.58	6.52	6.55
High IQ Group	7.38	6.88	7.13
Mean	6.40	6.44	6.42

Table 3

Intercorrelations of All Variables

Variables	1	2	3	4	5	6	7
1. P/M		.91****	.34**	.40***	.39***	-.31*	.10
2. Nospell			.42****	.35**	.39***	-.30*	.14
3. Control				.09	.32*	-.11	-.25
4. WC					.008	-.03	.01
5. IQ						-.34**	.01
6. Age							-.37***
7. Sex							

Note: P/M = 10 Phoneme/morpheme riddles
Nospell = the 7 P/M riddles which cannot be resolved using a spelling strategy
Control = 10 control riddles
WC = combined Woodcock reading score
IQ = Peabody Picture Vocabulary Test-Revised

*$p < .05$
**$p < .01$
***$p < .005$
****$p < .001$

Table 4

Summary of Hierarchical Multiple Regression Analyses for Three Sets of Riddles

Dependent Variable	Independent Variables	R	Increase in R^2
1. P/M	Sex	.10331	.01067
	Age	.31498	.08850
	IQ	.43559	.08876*
	WC	.58496	.15424***
2. Nospell	Sex	.14490	.02100
	Age	.29763	.06758
	IQ	.43582	.10136*
	WC	.55066	.11329**
3. Control	Sex	.24588	.06046
	Age	.32406	.04456
	IQ	.41571	.12826*
	WC	.42547	.05277

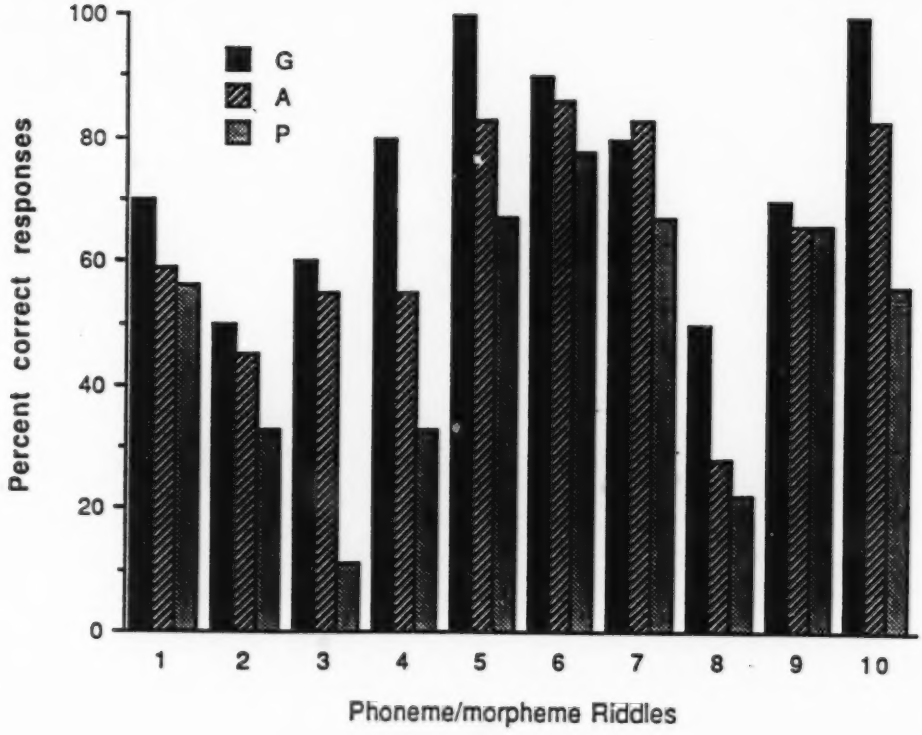
Note: P/M = 10 Phoneme/morpheme riddles
Nospell = the 7 P/M riddles which cannot be resolved using a spelling strategy
Control = 10 control riddles
WC = combined Woodcock reading score
IQ = Peabody Picture Vocabulary Test

*$p < .05$
**$p < .005$
***$p < .001$

Figure Caption

Figure 1. Percent correct responses on individual riddles by reading group, Good (G), Average (A), and Poor (P). Riddle numbers are keyed to the Appendices.

1a.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Percent correct responses
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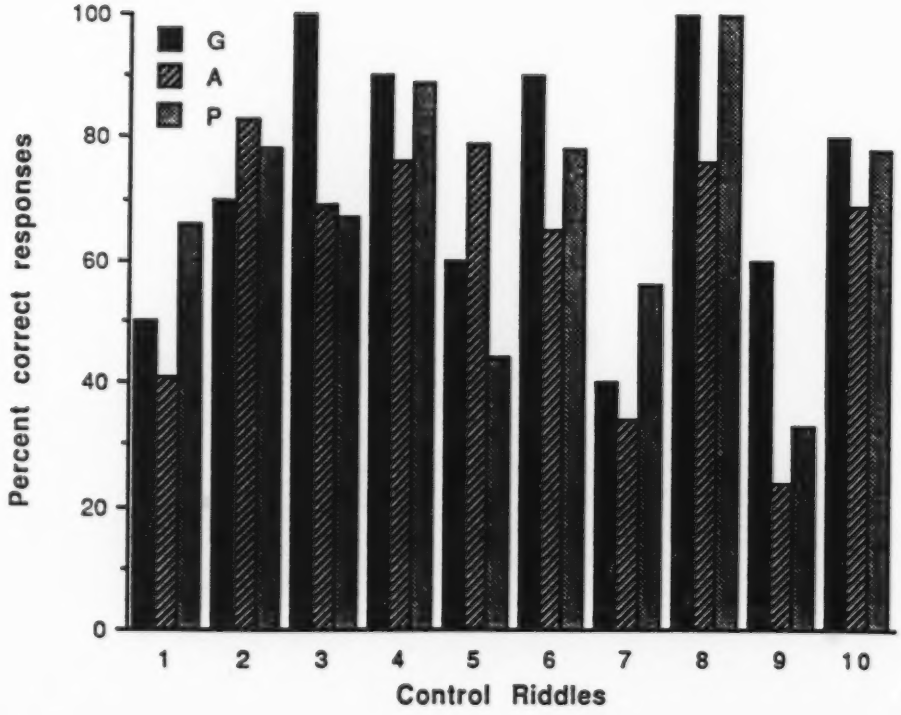
7
8
9
10
Phoneme/morpheme Riddles

1b.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Percent correct responses
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Control Riddles